
Ron Torell

Back to Basics

by **RON TORELL, DAN NELSON, & JASON DAVISON**

Matching hay quality to cow needs

Feeding range cattle through the winter is the most costly aspect of many livestock operations. However, if hay quality is matched to the nutritional demands of cattle, the purchase of supplements can be reduced and herd production can be increased. This can be accomplished by simply planning the sequence of hay feeding.

Improving hay quality through fertilization, water management, species composition and time of harvest may also reduce the cost of winter feeding. A nutritional analysis of 302 grass hay samples harvested from 70 northeastern Nevada ranches between 1946 and 2008 supports the above statements.

Critical months for nutrition

January, February and March are nutritionally critical months for the cows that will calve at the beginning of April. Nutritional demands are approximately 10% greater during the last third of the pregnancy. Allowing cows to lose excessive condition prior to calving will delay birth the following year. This is due to delayed estrus.[5]

Inadequate nutrition during the three months after calving (April, May and June) is even more detrimental to reproduction the following year. During these three months, nutritional demands are 20% higher than precalving requirements for cows and 25% higher for first-calf heifers. If the nutritional demands of the cows are not met during these critical six months (January through June), conception rates can be greatly reduced or delayed.[5,6] The same effect has been demonstrated with bred yearling heifers.[1,2]

A feeding plan based on the nutritional demands of cattle and quality of feed on hand can easily be developed for hay listed in Table 1. Table 1 allows comparison of the nutritional values of the hay to the nutritional needs of the 1,000-pound (lb.) cow for nine months (from the middle of pregnancy to three months after calving). For the purpose of discussion it is assumed that there is an adequate supply of each hay listed.

Middle third of pregnancy. The poorest-quality hay of the four listed is the late-cut, nonfertilized hay (see Table 2). Producers should feed this hay during the middle third of pregnancy, when the cow's nutritional demands are low. Late-cut hay falls just short of meeting requirements for protein and phosphorous (P), but meets or exceeds requirements for energy and calcium (Ca) during the middle term of pregnancy.

Last third of pregnancy. The early-cut nonfertilized hay (see Table 3) and the late-cut, fertilized hay (see Table 4) exceed the requirements for a cow in the middle third of pregnancy. The increased nutritional value of these hays will supply adequate nutrition for cows in the last three months of pregnancy when a phosphorous supplement is added. An energy-based supplement may be necessary under conditions of cold stress because the total digestible nutrient (TDN) values for these hays come close to meeting the cow's minimum energy requirements.

First three months postcalving. The early-cut, fertilized hay (see Table 5) is the only feed listed that meets all the cow's requirements following calving. Nutritional demands are the highest during this time because of lactation.

Minimize costly supplements

By efficiently managing the winter feeding program, it is possible to meet nutritional demands of the cow herd and minimize supplementation. Hay quality statistics listed in this article are averages for hays produced on northeastern Nevada ranches during the past 60 years. An average figure can only be used as a guide, because nutritional value varies from field to field and from one year to the next. Because of this, testing is essential in order to minimize supplement feed costs. The costs of forage testing are minimal compared to the costs of most protein and/or energy supplements.

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Table 1: Average quality of northeastern Nevada grass hay, 1946-2008*

Treatment	No. samples	Crude protein Avg.	Crude protein Range	Crude fiber	Ca	P	TDN**
Early cut, before 7/15:							
Fertilized	50	11.6	6.7-17.8	30.1	0.42	0.23	56.3
Nonfertilized	77	8.9	6.2-11.6	29.7	0.61	0.18	53.2
Late cut, after 7/15:							
Fertilized	36	7.9	2.5-11.3	32.2	0.48	0.18	52.4
Nonfertilized	139	6.7	3.3-9.9	32.6	0.50	0.17	51.3

Ca, calcium; P, phosphorus; TDN, total digestible nutrients.

*100% dry-matter basis.

**TDN values were estimated based on species composition of grass hays. TDN values were calculated from information provided by bibliography reference 3.

Table 2: Nutrient requirements of a 1,000-lb. cow in middle and last one-third of pregnancy and postpartum compared to nutritive value of northeastern Nevada hays cut late (after July 15) and nonfertilized

	% CP	Dif.	% TDN	Dif.	% Ca	Dif.	% P	Dif.
Nutritive value of hays, late cut, nonfertilized	6.7	—	51.3	—	0.50	—	0.17	—
Nutrient requirements of cows:								
Middle trimester	7.0	-0.30	48.8	+2.5	0.18	+0.32	0.18	-0.01
Last trimester	7.9	-1.12	53.6	-2.3	0.26	+0.24	0.21	-0.04
1-3 months postpartum	9.6	-2.90	56.6	-5.3	0.28	+0.22	0.22	-0.05

Source: *Nutrient Requirement of Domestic Animals:* Sixth revised edition, 1984. These requirement values assume that DM intake of forage is 18 lb. for a 1,000-lb. animal in the second trimester, 19.5 lb. for the last trimester and 21.8 lb. for the first three months postpartum. DM consumption should vary depending on the energy concentration of the diet and environmental conditions.

Ca, calcium; P, phosphorus; TDN, total digestible nutrients.

Table 3: Nutrient requirements of a 1,000-lb. cow in middle and last one-third of pregnancy and postpartum compared to nutritive value of northeastern Nevada hays cut early (before July 15) and nonfertilized

	% CP	Dif.	% TDN	Dif.	% Ca	Dif.	% P	Dif.
Nutritive value of hays, early cut, nonfertilized	8.9	—	53.2	—	0.61	—	0.18	—
Nutrient requirements of cows:								
Middle trimester	7.0	+1.9	48.8	+4.4	0.18	+0.43	0.18	0
Last trimester	7.9	+1.0	53.6	-0.4	0.26	+0.35	0.21	-0.03
1-3 months postpartum	9.6	-0.7	56.6	-3.4	0.28	+0.33	0.22	-0.04

Source: *Nutrient Requirement of Domestic Animals:* Sixth revised edition, 1984. These requirement values assume that DM intake of forage is 18 lb. for a 1,000-lb. animal in the second trimester, 19.5 lb. for the last trimester and 21.8 lb. for the first three months postpartum. DM consumption should vary depending on the energy concentration of the diet and environmental conditions.

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Importance of forage quantity

Cattle require quantities of nutrients not percentages of nutrients. The percentage of nutrients needed to balance the rations discussed in this article will be incorrect when the amount of hay fed is less or more than the quantity required (depending on the weight and physiological condition of the animal). Cattle can suffer from "hollow belly" when insufficient forage is fed, no matter what the forage nutrient density is. Generally, an animal's dry-matter (DM) intake ranges from 1% to 3% of its body weight depending on the forage quality. The higher the forage quality the greater the intake. Also, it is important to remember that environmental conditions often create the need for additional forage intake during winter months.

Purchasing additional feed based on the quality and quantity of feed on hand can save money. Alfalfa hay that does not meet dairy industry specifications can often be purchased cheaper than processed supplements on the basis of actual protein per pound. A combination of homegrown hay, purchased alfalfa hay and a phosphorous supplement will usually balance the nutritional needs of the cow herd during critical periods of the year.

The best way to purchase feed, and balance a ration with feed on hand, is through nutritional chemical analysis and least-cost ration formulation.

If you would like to discuss this article or simply talk cows, contact Ron at 775-738-1721 or torellr@unce.unr.edu, Dan at 775-289-4459 or nelsond@unce.unr.edu, or Jay at 775-423-5121 or davisonj@unce.unr.edu.

Information sources:

[1]Bellows, R.W., and R.E. Short. 1978. Effects of precalving feeding level on birth weight, calving difficulty and subsequent fertility. *Journal of Animal Science* 46:1522.

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[3]Fonesbeck, P.V., and H. Lloyd. 1984. IFI Tables of feed consumption. International Feed Stuffs Institute. Utah State University, Logan, Utah.

[4]NRC. 1984. *Nutrient Requirements of Beef Cattle.* National Research Council, National Academic Press, Washington, D.C.

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Table 4: Nutrient requirements of a 1,000-lb. cow in middle and last one-third of pregnancy and postpartum compared to nutritive value of northeastern Nevada hays cut late (after July 15) and fertilized

	% CP	Dif.	% TDN	Dif.	% Ca	Dif.	% P	Dif.
Nutritive value of hays, late, fertilized	7.9	—	52.4	—	0.48	—	0.18	—
Nutrient requirements of cows:								
Middle trimester	7.0	+0.9	48.8	+3.6	0.18	+0.30	0.18	0
Last trimester	7.9	+0.0	53.6	-1.2	0.26	+0.22	0.21	-0.03
1-3 months postpartum	9.6	-1.7	56.6	-4.2	0.28	+0.20	0.22	-0.04

Source: *Nutrient Requirement of Domestic Animals:* Sixth revised edition, 1984. These requirement values assume that DM intake of forage is 18 lb. for a 1,000-lb. animal in the second trimester, 19.5 lb. for the last trimester and 21.8 lb. for the first three months postpartum. DM consumption should vary depending on the energy concentration of the diet and environmental conditions.

Ca, calcium; P, phosphorus; TDN, total digestible nutrients.

Table 5: Nutrient requirements of a 1,000-lb. cow in middle and last one-third of pregnancy and postpartum compared to nutritive value of northeastern Nevada hays cut early (before July 15) and fertilized

	% CP	Dif.	% TDN	Dif.	% Ca	Dif.	% P	Dif.
Nutritive value of hays, early cut, fertilized	11.6	—	56.3	—	0.42	—	0.23	—
Nutrient requirements of cows:								
Middle trimester	7.0	+4.6	48.8	+7.5	0.18	+0.24	0.18	+0.05
Last trimester	7.9	+3.7	53.6	+2.7	0.26	+0.16	0.21	+0.02
1-3 months postpartum	9.6	+2.0	56.6	+0.3	0.28	+0.14	0.22	+0.01

Source: *Nutrient Requirement of Domestic Animals:* Sixth revised edition, 1984. These requirement values assume that DM intake of forage is 18 lb. for a 1,000-lb. animal in the second trimester, 19.5 lb. for the last trimester and 21.8 lb. for the first three months postpartum. DM consumption should vary depending on the energy concentration of the diet and environmental conditions.

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